KRAMER ELECTRONICS, Ltd.

USER MANUAL

6X1 Switchers / Scanners

Models:

VS-16N

VS-16A

IMPORTANT: Before proceeding, please read paragraph entitled "Unpacking and Contents"

Table of Contents

Section	Name	Page
1	INTRODUCTION	2
1.1	A Word on Switchers	2
1.2	Factors Affecting Quality of Results	2
2	SPECIFICATIONS	3
3	HOW DO I GET STARTED?	3
4	UNPACKING AND CONTENTS	3
4.1	Optional Accessories	4
5	VS SERIES SWITCHERS/SCANNERS	5
5.1	Getting to Know Your VS-16N Switcher/Scanner	5
5.2	Getting to Know Your VS-16A Switcher/Scanner	6
6	INSTALLATION	7
6.1	Rack Mounting	7
7	CONNECTING TO VIDEO and AUDIO DEVICES	7
8	USING the VIDEO/AUDIO SWITCHERS/SCANNERS	7
8.1	Controlling the Switcher	7
8.1.1	Start/Stop Switch	7
8.1.2	Dwell Time Switch	7
8.1.3	Enable/Disable Switch	7
8.1.4	Self Address	8
8.1.5	UP and Down Switches	8
8.1.6	ENTER Switch	8
8.1.7	Remote Connectors (rear)	8
8.2	RS-485	8
9	TAKING CARE OF YOUR SWITCHER	9
10	TROUBLESHOOTING	9
10.1	Video and other High Frequency Signals	9
10.2	Audio Signal	10
	Limited Warranty	10

List of Illustrations

Figure		
1	VS-16N Front/Rear Panel Features	5
2	VS-16A Front/Rear Panel Features	6

List of Tables

Table		
1	VS-16N Front/Rear Panel Features	5
2	VS-16A Front/Rear Panel Features	6

1. INTRODUCTION

Congratulations on your purchase of this Kramer Electronics switcher/scanner. Since 1981 Kramer has been dedicated to the development and manufacture of high quality video/audio equipment. The Kramer line has become an integral part of many of the best production and presentation facilities around the world. In recent years, Kramer has redesigned and upgraded most of the line, making the best even better. Kramer's line of professional video/audio electronics is one of the most versatile and complete available, and is a true leader in terms of quality, workmanship, price/performance ratio and innovation. In addition to the Kramer line of high quality switchers, such as the one you have just purchased, Kramer also offers a full line of high quality distribution amplifiers, processors, interfaces, controllers and computer-related products. This manual includes configuration, operation and option information for the following products from the Kramer VS line of switchers/scanner. All these VS switchers/scanners are similar in operation and features. The switchers/scanners described in this manual are listed below:

- **VS-16N** - 6x1 Video Switcher/Scanner
- **VS-16A** - 6x1 Dual Wideband Switcher/Scanner

1.1 A Word on Switchers

Switchers route one or more signals to one or more users. They vary in the number of inputs, programming capability, number of outputs, operating format (composite video, component, audio etc.) and switching method (i.e., whether they switch during the vertical interval or not, whether they are electronic, RS232 or mechanically controlled). A video/audio switcher usually switches between several sources (inputs) and one or more acceptors (outputs). A switcher that allows several inputs to be connected to several outputs simultaneously is called a Matrix Switcher. Switchers may be of the electronic or mechanical type. Most matrices are of the active electronic type, with many crosspoints. Vertical Interval Switching, frequently used in video, ensures that the transition from one video source to another is smooth and without interference. The mechanical switchers described in this manual have full industrial specifications and are rack-mountable. The video/audio switchers offer a simple and economic solution for every video/audio application. Due to very careful design the video bandwidth is excellent.

1.2 Factors Affecting Quality of Results

The factors affecting the quality of results when signals are transmitted from a source to an acceptor are:

Connection cables	Low quality cables are susceptible to interference; they degrade signal quality due to poor matching and cause elevated noise levels. They should therefore be of the best quality.
Sockets and connectors of the sources and acceptors	So often ignored, they should be of highest quality, since "Zero Ohm" connection resistance is the objective. Sockets and connectors also must match the required impedance (75ohm in video). Cheap, low quality connectors tend to rust, thus causing breaks in the signal path.
Distance between sources and acceptors	Plays a major role in the final result. For long distances (over 15 meters) between sources and acceptors, special measures should be taken in order to avoid cable losses. These include using higher quality cables or adding line amplifiers.
Interference from neighboring electrical appliances	These can have an adverse effect on signal quality. Balanced audio lines are less prone to interference, but unbalanced audio should be installed far from any mains power cables, electric motors, transmitters, etc. even when the cables are shielded.

2. SPECIFICATIONS

	VS-16N	VS-16A
Function	6x1 Video Switcher/Scanner	6x1 Dual Wideband Switcher/Scanner
Inputs	6 video, 1Vpp / 75 ohms on BNCs, 6 binding posts for external control	6 dual signal sources- audio, video or component, level and impedance are source dependent, on RCA connectors. 6 terminal blocks for external remote control.
Outputs	1 composite video, looping, 1 Vpp/75 Ω on a BNC.	1 dual signal - audio, video or component, level and impedance are acceptor dependent, on RCA connectors.
Bandwidth	40 MHz. -3dB.	540 MHz. -3dB.
Differential Gain	0.9%.	0.02%.
Differential Phase	0.37 Deg.	0.02 Deg.
K-Factor	<0.05%.	<0.05%
S/N Ratio	>72 dB.	>72 dB
Crosstalk	<50 dB @ 5 MHz	<50 dB @ 5 MHz
Controls	Automatic, manual, RS-485, and contact closure. Switching during Vertical Interval (derived from source no. 1).	Automatic, manual, RS-485 and remote contact closure.
Dimensions (W, D, H)	24.5cm x 18cm x 4.5cm (9.6" x 7" x 1.8")	24.5cm x 18cm x 4.5cm (9.6" x 7" x 1.8")
Weight	1. 5kg. (3.3lbs.) Approx.	1.3kg. (2.9lbs.) Approx.

3. HOW DO I GET STARTED?

The fastest way to get started is to take your time and do everything right the first time. Taking 15 minutes to read the manual may save you a few hours later. You don't even have to read the whole manual. At the beginning of each section, you'll find an overview of the section. If the section doesn't apply to you, you don't have to spend your time reading it.

4. UNPACKING AND CONTENTS

The items contained in your Kramer VS switcher/scanner package are listed below. Please save the original box and packaging materials for possible future shipment.

- Switcher/Scanner
- User Manual
- Kramer concise product catalog
- 4 rubber feet
- Power Cord

For additional information regarding optional cables and additional accessories, contact your Kramer dealer.

4.1 Optional Accessories

The following accessories, which are available from Kramer, can enhance implementation of your switcher.

- **Rack Adapter** - Used to adapt smaller machines to a standard 1U rack. One or more machines may be installed on each adapter.
- **BNC "Y" Connector** - Used for looping purposes and splits the incoming signal to enable connection of an additional machine.
- **SP-11** - (Video/Audio Processor) can be serially connected between the video/audio source and the VS switcher/scanner for video and audio control/correction. The machine may provide camera control and luminance/white balance correction. The SP-11 is also capable of performing Composite to Y/C switching and bi-directional Transcoding. The machine allows full control over the video signal: Video gain down to full fade, log or linear Definition control, log or linear Contrast control, Color saturation control, Black Level control, Red, Green and Blue controls and a Screen Splitter control for "before-after" comparison.
- **VM-1010** - (Video Distribution Amplifier) can be serially connected between the switcher/scanner and the acceptors for video distribution. It is a full broadcast, state-of-the-art, and programmable video distribution amplifier. The VM-1010 has two looping video inputs, each splitting to 5 outputs. The user may select 2x1:5 or 1:10 operation via front panel control switches. Several VM-1010 units may be chained through the looping inputs. Output signals are (user selectable) DC or AC coupled for maximum flexibility.
- **VM-20ARII** - (Programmable Video/Audio Distribution Amplifier) can be serially connected between the switcher/scanner and the video/audio acceptors for video/audio distribution. It is a full bandwidth, state-of-the-art, 1:20 Programmable video/audio distribution. The VM-20ARII splits a single video and audio input source into twenty identical outputs with no discernible signal degradation. The VM-20ARII has four looping video and audio (stereo) inputs and a user programmable mode of operation. The VM-20ARII can function as a 1:20, 2x1:10, 4x1:5 or 1:10+2x1:5 DA, and audio operation mode may be separated from video mode. Output signals are DC or AC coupled (user selectable) for highest signal fidelity. Due to the extended bandwidth of the machine it can be also used for video/graphics component distribution. The machine has video gain and EQ. controls for 4 sets of 5 outputs, as well as audio level controls. The audio section may be programmed to function as unbalanced stereo or balanced mono.
- **VIDEO TESTER** - A unique, patented, indispensable tool for the video professional, the Video Tester is used to test a video path leading to/from a switcher. By pressing only one touch switch it can trace missing signals, distinguish between good and jittery (VCR sourced) signals, and identify the presence of good signals. Whenever a video signal is missing, because of bad connections, cable breaks or faulty sources, the Video Tester is all you need. No need for oscilloscopes, waveform monitors or a Vectorscope to trace and rectify such common problems. Indispensable for fieldwork, the Tester checks for sync and odd/even data in the signal and is not triggered by noise, hum or even by a 15kHz non-video source. The Video Tester is compact (not much bigger than a cigarette box), housed in sturdy plastic housing with pocket clip and is operated by a 9Volt battery for three continuous hours of operation (the full shelf life of the battery).

5. VS SERIES SWITCHERS/SCANNERS

This section describes all the controls and connections of your switcher/scanner. Understanding the controls and connections helps you realize the full power of your switcher.

5.1 Getting to Know Your VS-16N Switcher/Scanner

The Kramer **VS-16N** is a 6x1 scanning switcher designed for composite video signals using BNC connectors. Inputs can be selected using the front panel in addition to the typical scanning mode. Bandwidth of 40 MHz ensures transparent performance with common video sources such as cameras and VCRs.

The **VS-16N** can be programmed to scan automatically, skipping unused inputs if desired. It can be controlled by front panel buttons, RS-485, or by simply shorting the relevant pin to ground on the back panel screw terminal connector. It is ideal for many applications in retail stores, studios, showrooms, and in many CCTV and security applications. Up to 15 machines can be cascaded to form larger systems including 12x1, 18x1, etc.

The **VS-16N** connects to other units via RS-485 and output looping.

Front/rear panel features of the **VS-16N** are described in Figure 1 and Table 1.

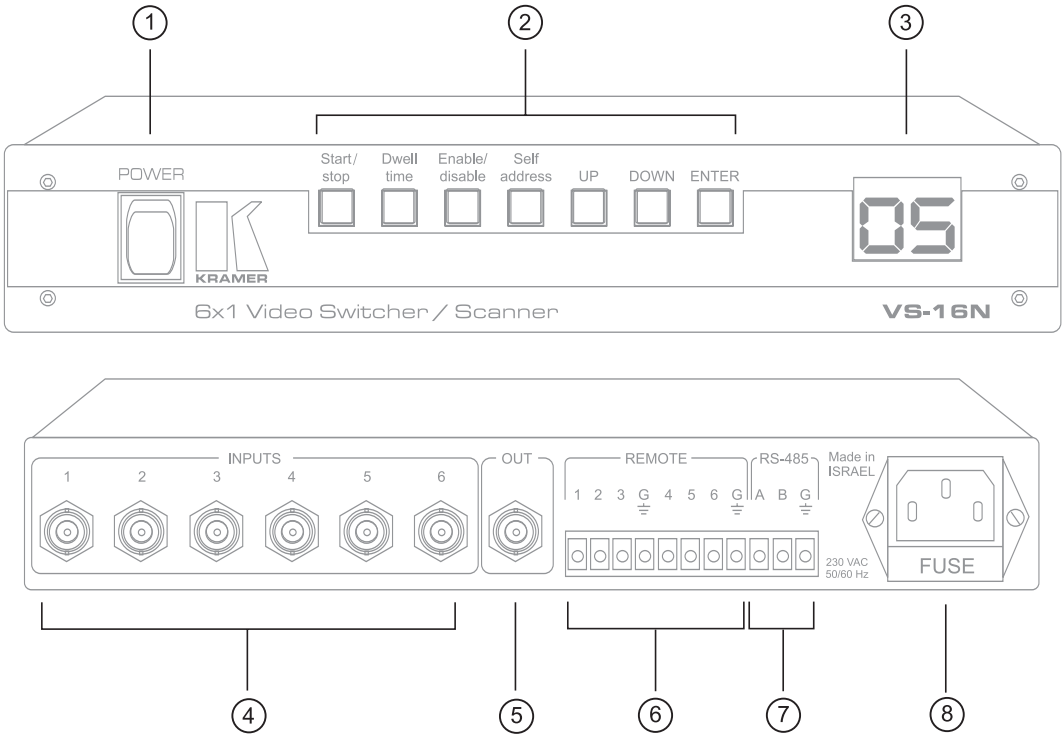

Figure 1: VS-16N Front/Rear Panel Features

Table 1: VS-16N Front/Rear Panel Features

No.	Feature	Function
1	**POWER**	Power ON/Off Switch, illuminates when toggled
2	**Programming Buttons**	Controlling the functions of the machine
3	**LED Display**	Showing machine status, and for programming
4	**INPUTS**	6 Video inputs on BNC connectors
5	**OUT**	Looping video output on a BNC connector
6	**REMOTE**	Dry contact remote control binding posts
7	**RS-485**	RS-485 control binding post
8	**POWER SOCKET**	A fused socket for connecting the mains power cord

5.2 Getting to Know Your VS-16A Switcher/Scanner

The Kramer **VS-16A** is a high performance two-channel 6x1 scanning switcher compatible with a wide variety of signals including audio, video, and component video using dual RCA connectors. Inputs can be selected manually in addition to the typical scanning mode. Exceptionally high bandwidth of 540MHz ensures transparent performance. Input impedance depends on the source, and output impedance is established by the display or recording device.

The **VS-16A** can be programmed to scan automatically, skipping unused inputs if desired. It can be controlled by front panel buttons, RS-485, or by simply shorting the relevant pin to ground on the back panel screw terminal connector. It is ideal for many applications in retail stores, studios, showrooms, and in many CCTV and security applications. Up to 15 machines can be cascaded to form larger systems including 12x1, 18x1, etc. The **VS-16A** connects to other units via RS-485 and output looping.

Front/rear panel features of the **VS-16A** are described in Figure 2 and Table 2.

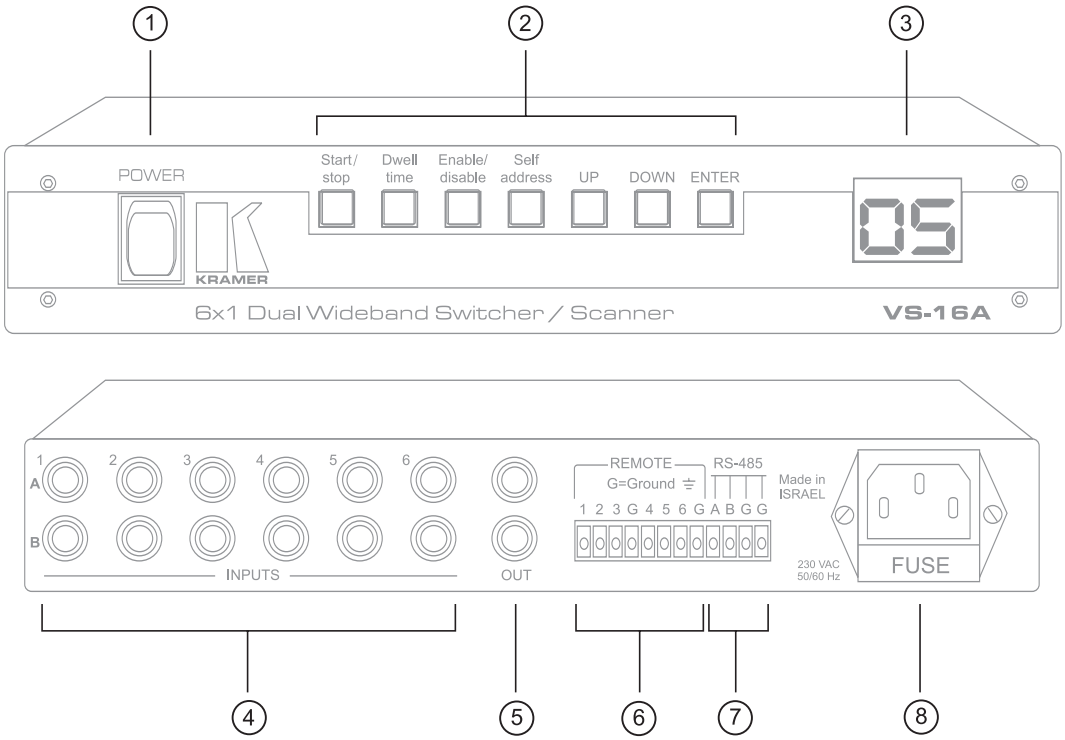

Figure 2: VS-16A Front/Rear Panel Features

Table 2: VS-16A Front/Rear Panel Features

No.	Feature	Function
1	**POWER**	Power ON/Off Switch, illuminates when toggled
2	**Programming Buttons**	Controlling the functions of the machine
3	**LED Display**	Showing machine status, and for programming
4	**INPUTS**	6 dual signal inputs on RCA connectors
5	**OUT**	Looping dual wideband signal outputs on a RCAs
6	**REMOTE**	Dry contact remote control binding posts
7	**RS-485**	RS-485 control binding post
8	**POWER SOCKET**	A fused socket for connecting the mains power cord

6. INSTALLATION

6.1 Rack Mounting

The **VS-16N** and **VS-16A** switchers/scanners may be rack-mounted in a standard 19" (1U) EIA rack assembly using an optional rack adapter. The switchers in this manual do not require any spacing above or below them for ventilation.

7. CONNECTING to VIDEO AND AUDIO DEVICES

1. Connect from one to six sources (or dual signal sources) to the inputs on the rear panel of the **VS-16N** (**VS-16A**) using recommended cables, taking care that all connections are correct.

2. Connect a signal acceptor to the output sockets on the rear panel of the **VS-16N** or **VS-16A**. If your are setting up a multi-switch system, (an 18x1 scanner system for example) all output connectors should be connected in parallel using "T" or "Y" connectors, while the last switcher output is connected via the "T" or "Y" connector to the previous switcher and to the video acceptor (monitor, VCR etc.)

3. Connect, if necessary, 6 control wires to the "REMOTE" connectors on the rear panel of the machine. Two additional ground connections are available, and both may be used.

4. Connect three wires to the *RS-485* connectors on the rear panel of the machine if *RS-485* control or system extension is needed. If a multi-switch system is being set-up, connect all the wires in parallel between all switchers, e.g., A to A, B to B and G to G (Ground). If an external *RS-485* controller is used, it must be connected to this bank in a similar way.

5. Connect the **VS-16N** or **VS-16A** to a power source and turn it on.

8. USING the VIDEO /AUDIO SWITCHERS/SCANNERS

8.1 Controlling the Switcher

8.1.1 Start/Stop Switch

This switch changes the mode between Switcher and Scanner operation. In Scanner operation (automatic switching) the decimal point on the lower right corner of the display will blink. In Switcher mode (manual) the decimal point will be off. The machine will scan only inputs, which are ENABLED.

8.1.2 Dwell time Switch

This switch controls the dwell time when automatically switching. When the switch is pressed, the display will blink, showing the preset dwell time. By pressing the UP or DOWN keys the time may be changed.
The dwell time may be set between 2 and 99 seconds. After reaching the required dwell time, press the ENTER switch.

8.1.3 Enable/Disable Switch

This switch controls the enabled/disabled inputs while scanning. When the switch is pressed, the right display will show the input number, while on the left display will show either the letter E (enabled) or D (disabled). Toggling between modes E and D is done by pressing again this switch. Pressing the UP or DOWN key browses all the inputs, showing their status. Changing the status is done by pressing the Enable/Disable switch. When you finished programming the machine, press the ENTER switch.

8.1.4 Self Address

This switch controls the self address of the machine. When the machine works stand-alone, it's self address is 1. When this key is pressed, the number shown on the display is the self-address of the machine.
The address may be changed by pressing the UP or DOWN keys. When finished, press the ENTER switch.
When operated as a stand-alone machine, the self-address must be set to 1. When more machines are connected to the system, the numbers should be set in contiguity - e.g., 2, 3, 4 etc. The maximum number of machines that can be chained is 15.

8.1.5 UP and DOWN Switches

These switches operate when the machine works as a Switcher (manual mode). Pressing the UP switch moves to the next (higher numbered) input (moving from 4 to 5 for example). Pressing the DOWN switch does the opposite operation. When you reached the required input, press the ENTER key, then this input will be routed to the output. The switching in the **VS-16N** machine takes place during the Vertical Interval derived from source number 1. The switching in the **VS-16A** takes place immediately when the button is touched or when an internal or external command is given

8.1.6 ENTER Switch

Pressing this switch in Switcher mode will display input 1 on this machine. Pressing the UP switch will move to the next input etc. To form the connection, press the ENTER key again.
The connected switchers recognize each other in the chain. For example, if you press the ENTER switch in machine no. 2, and press twice the UP key, and then ENTER again, the display will show input 9 which corresponds to input 3 on machine 2 (6+3=9).

8.1.7 Remote connectors (rear)

When a wire connected to one of the remote connectors is shorted to ground (available on two additional connectors on the REMOTE bank) the corresponding input will be connected to the output.

8.2 RS-485

Via this connector bank, the machine can control or be controlled via RS-485 control. When several machines are connected to form a large switcher/scanner setup, the RS-485 connectors should be all connected in parallel, i.e., A to A, B to B and G to G (Ground). Please double check the wiring, as reversing a connection may damage the machine or the controller.

9. TAKING CARE of YOUR SWITCHER/SCANNER

Do not locate your switcher/scanner in an environment where it is susceptible to dust or moisture. Both of these may damage the electronics, and cause erratic operation or failure. Do not locate your switcher where temperature and humidity may be excessive. Doing so may also damage the electronics, and cause erratic operation or failure of your switcher. Do not clean your switcher/scanner with abrasives or strong cleaners. Doing so may remove or damage the finish, or may allow moisture to build up. Take care not to allow dust or particles to build up inside unused or open connectors.

10. TROUBLESHOOTING

NOTES

1. *Please note that if the output signal is disturbed or interrupted by very strong external electromagnetic interference, it should return and stabilize when such interference ends. If not, turn the acceptor/source power switch off and on again to reset the machine.*
2. *If the following recommended actions still do not result in satisfactory operation, please consult your KRAMER Dealer.*

10.1 Video and other High Frequency Signals

Problem	Remedy
No signal at the output device, regardless of input selected.	1. Confirm that your sources and output device are powered on and connected properly. 2. Confirm that any other devices in the signal path have the proper input and/or output selected. 3. Use a Video Tester to test the video path leading to/from your switcher (see section 4.1 " Video Tester")
Signal level is too high or too dim.	1. Verify that the signal line is well matched through 75ohm impedance; otherwise it results in a signal level that is too high or too dim. 2. Confirm that the connecting cables are of high quality, properly built and terminated with 75ohm BNC connectors. Check level controls located on your source input device or output display or recorder.

Problem	Remedy
Noise bars "roll" up or down in the output image or: Low Frequency Hum in the output signal	Hum bars (ground loop) are caused by a difference in the ground potential of any two or more devices connected to your signal path. This difference is compensated by passing that voltage difference through any available interconnection, including your video cables. WARNING! DO NOT DISCONNECT THE GROUND FROM ANY PIECE OF VIDEO EQUIPMENT IN YOUR SIGNAL PATH! Check the following to remove hum bars: 3. Confirm that all interconnected equipment is connected to the same phase of power, if possible. 4. Remove equipment connected to that phase that may introduce noise, such as motors, generators, etc. 5. Disconnect all interconnect cables and reconnect them one at a time until ground loop reappears. 6. Disconnect the affected cable and replace, or insert an isolation transformer in the signal path.

10.2 Audio Signal

Problem	Remedy
No audio at the output device, regardless of input selected	1. Confirm that your sources and output device are turned on and connected properly. Audio signals connected to the input of your switcher should be properly wired to the output of your source. Audio signals connected to the output of your switcher should be properly wired to the input of your switcher or acceptor. 2. Confirm that any other switchers in the signal path have the proper input and/or output selected. Pay special attention to input switchers that may be built into your switchers or recording device.
Audio level is too low	1. Confirm that the connecting cables are of high quality and properly built. 2. Check level controls located on your source input device or output device.

LIMITED WARRANTY

Kramer Electronics (hereafter Kramer) warrants this product to be free from defects in material and workmanship under the following terms.

HOW LONG IS THE WARRANTY

Labor and parts are warranted for three years from the date of the first customer purchase.

WHO IS PROTECTED

Only the first purchase customer may enforce this warranty.

WHAT IS COVERED AND WHAT IS NOT COVERED

Except as below, this warranty covers all defects in material or workmanship in this product. The following are not covered by the warranty:

1) Any product which is not distributed by Kramer or which is not purchased from an authorized Kramer dealer. If you are uncertain as to whether a dealer is authorized, please contact Kramer at one of the agents listed in the web site **www.kramerelectronics.com**.
2) Any product, on which the serial number has been defaced, modified or removed.
3) Damage, deterioration or malfunction resulting from:
   a) Accident, misuse, abuse, neglect, fire, water, lightning or other acts of nature, unauthorized product modification, or failure to follow instructions supplied with the product.
   b) Repair or attempted repair by anyone not authorized by Kramer.
   c) Any shipment of the product (claims must be presented to the carrier).
   d) Removal or installation of the product.
   e) Any other cause, which does not relate to a product defect.
   f) Cartons, equipment enclosures, cables or accessories used in conjunction with the product.

WHAT WE WILL PAY FOR AND WHAT WE WILL NOT PAY FOR

We will pay labor and material expenses for covered items. We will not pay for the following:

1) Removal or installations charges.
2) Costs of initial technical adjustments (set-up), including adjustment of user controls or programming. These costs are the responsibility of the Kramer dealer from whom the product was purchased.
3) Shipping charges.

HOW YOU CAN GET WARRANTY SERVICE

To obtain service on you product, you must take or ship it prepaid to any authorized Kramer service center.
Whenever warranty service is required, the original dated invoice (or a copy) must be presented as proof of warranty coverage, and should be included in any shipment of the product. Please also include in any mailing a contact name, company, address, and a description of the problem(s).
For the name of the nearest Kramer authorized service center, consult your authorized dealer.

LIMITATION OF IMPLIED WARRANTIES

All implied warranties, including warranties of merchantability and fitness for a particular purpose, are limited in duration to the length of this warranty.

EXCLUSION OF DAMAGES

Kramer's liability for any defective products is limited to the repair or replacement of the product at our option. Kramer shall not be liable for:
Damage to other property caused by defects in this product, damages based upon inconvenience, loss of use of the product, loss of time, commercial loss; or:
Any other damages, whether incidental, consequential or otherwise. Some countries may not allow limitations on how long an implied warranty lasts and/or do not allow the exclusion or limitation of incidental or consequential damages, so the above limitations and exclusions may not apply to you.
This warranty gives you specific legal rights, and you may also have other rights, which vary from place to place.

NOTE: All products returned to Kramer for service must have prior approval. This may be obtained from your dealer.

NOTICE

This equipment has been tested to determine compliance with the requirements of:

EN-50081:	"Electromagnetic compatibility (EMC); generic emission standard. Part 1: Residential, commercial and light industry"
EN-50082:	"Electromagnetic compatibility (EMC) generic immunity standard. Part 1: Residential, commercial and light industry environment".
CFR-47	FCC Rules and Regulations: Part 15- "Radio frequency devices: Subpart B- Unintentional radiators

CAUTION

- Servicing of the above mentioned machines is only allowed to a Kramer authorized technician or Engineer. Any user who makes changes or modifications to the unit without the express approval of the manufacturer will void user authority to operate the equipment.
- Use the DC power supply (provided) to supply power to the machine and controllers.
- Please use recommended interconnect cables to connect the machine to controllers and other components.

The list of Kramer distributors appears on our web site:
www.kramerelectronics.com
From the web site it is also possible to e-mail factory headquarters.
We welcome your questions, comments and feedback.

KRAMER ELECTRONICS, LTD.

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